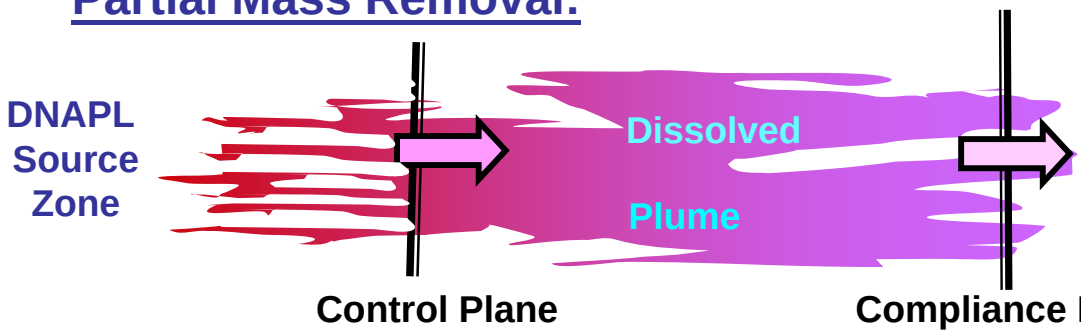
Linking Mass Flux and Discharge to Remedial Performance and Objectives

- When is mass discharge [M/T] an appropriate metric?
- When is mass flux [$M/L^2/T$] relevant?
- How to consider the size of the site?
  - Volume of NAPL [L^3]
  - Cross sectional area to flow [L^2]
  - Volume of NAPL contaminated media [L^3]
- Should average mass flux be considered?
  - Area averaged over?

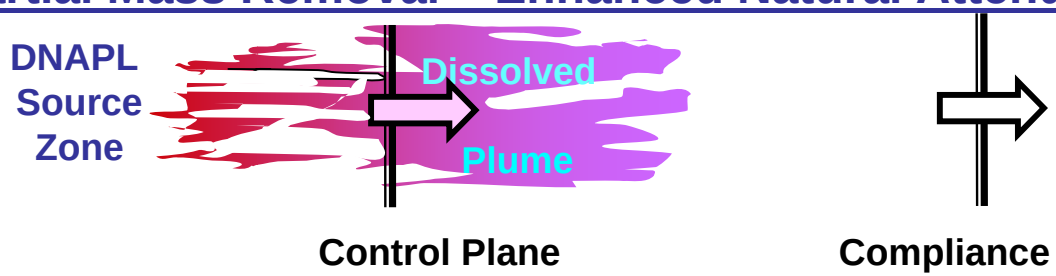
To predict down-gradient plume response
We need to know mass flux and/or discharge at the source zone
and the *Attenuation Capacity of the Aquifer*

Pre-Remediation:

Partial Mass Removal:

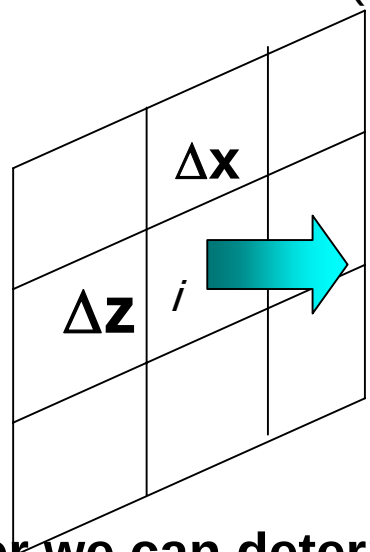


Partial Mass Removal + Enhanced Natural Attenuation:



$$M_d = \sum J_i A_i$$

Control Plane (CP)



$A_i = \Delta x \, \Delta z$

$J_i = q_i \, C_i$

$q_i = -K_s \, i$

If we know the attenuation capacity of the aquifer we can determine an acceptable mass flux given some compliance point location

A Tale of Three Sites

Site	Volume NAPL [L]	NAPL contaminated media [m^3]	Max Mass Flux ($g/m^2/day$)	Average Mass Flux ($g/m^2/day$)	Mass Discharge (g/day)
Sages Dry Cleaner	30	420	2.2	0.1	0.35
Hill AFB OU-2	1,300	6,700	16	2.5	96
Ft. Lewis EDGY	2,500	70,000	18	1.6	750

Which data best characterized conditions at the site and relevance to the plume?

Research needed linking source flux to plume response and attenuation capacity of the aquifer